*Proposed synopsis on*

# "SYNTHESIS, CHARACTERIZATION AND BIOLOGICAL POTENTIAL OF CHALCONES AND THEIR DERIVATIVES"

*Submitted to*

स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड.

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*For The Degree of*

**Doctor of Philosophy (Ph.D.)**

*In the subject*

**Chemistry**

Under the faculty Science

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## 1. INTRODUCTION

Chalcone is an important biological precursor of flavonoids and isoflavonoids which are predominantly found in various kinds of plants. It shows various kinds of biological as well as pharmacological properties such as antiviral, antifungal, anticancer, anti-diabetic, anti-inflammatory, etc. Chalcone is a 1, 3-diphenyl-2-propen-1-one derivative, which possesses two aromatic rings joined together by an alpha-beta unsaturated carbonyl system. Because of its wide range of biological and medicinal applications and skeletal modification features, chalcone plays a very vital role in drug discovery. Chalcones exist naturally as well and they can be synthesized artificially. As an intermediate, chalcones play a vital role in the synthesis of various heterocyclic compounds. The present study includes the synthesis of novel chalcones and their derivatives. Biological activity evaluation is also another important purpose of this study.

## 2. REVIEW OF LITERATURE

The literature review revealed that most of the novel chalcones and their derivatives were synthesized using condensation reactions, coupling reactions, etc. It has been found that most of the studies tried to study various properties of these chalcone scaffolds such as biological, medicinal, etc. some of the important findings obtained via the literature survey are mentioned below;

- Chalcone derivatives were systematically synthesized with the intention of utilizing them as precursors in hydrogenation transfer reactions, ultimately yielding dihydrochalcones. Notably, a significant focus was directed towards a qualitative assessment of the influence exerted by hydroxyl substituents. The synthesis procedure encompassed the successful generation of compounds including 4-hydroxychalcone, alongside various other chalcone analogs [1].
- Synthesis of novel chalcones and its derivatives showing antiviral activity were found during literature review. Good results related to anti-TMV activity were observed [2].
- Chalcones containing different heterocyclic scaffolds were synthesized which showed different pharmacological activities [3].
- Various chalcones containing rhodanine-3-acetic acid moiety with potential antibacterial activity were also observed during the literature review [4].
- The synthesis of epoxy chalcones, which exhibit notable antibacterial and antifungal properties, has been documented in the scientific literature [5].

- Various other novel chalcone synthesis showing antioxidant studies [6], molecular docking studies [7], fluorescence activity [8], anti-breast cancer activity [9], antimalarial activity [10], etc. were observed during the literature review.
- The latest advancement in chalcone synthesis has encompassed the incorporation of diverse N, O, and S heterocycles. This synthetic approach notably encompasses an investigation into the biological functionalities exhibited by chalcone derivatives that carry five-membered N-heterocycles, five-membered S-heterocycles, as well as five and six-membered O-heterocycles [11].
- S. L. Gaonkar and U. N. Vignesh given review about different methods of synthesis of chalcones and various pharmacological properties such as anti-inflammatory activity, antimicrobial activity, anti-tubercular activity, etc. [12].

In a similar fashion literature survey will be carried out in order to synthesize a series of derivatives from newly synthesized chalcones and perform the evaluation of biological activities of newly synthesized chalcones and their derivatives. With this view, the present study comprises synthesis of novel chalcones and their derivatives such as pyrazoline, isooxazoline, benzodiazepine, benzothiazepine, etc. Hence the topic of this research proposal is **"Synthesis, Characterization and Biological Potential of Chalcones and Their Derivatives"**.

## 3. OBJECTIVES OF RESEARCH

The objectives of the present are as follows;

- To synthesize different halosubstituted aldehydes and ketones.
- Carry out the synthesis of different novel chalcones.
- Synthesis of derivatives of chalcones from newly synthesized chalcones.
- Characterization of obtained products with the help of spectral techniques.
- Perform a study of the biological activity of newly synthesized chalcones and their derivatives.

## 4. METHODOLOGY TO BE ADOPTED

Various methods of preparation from organic synthesis approach will be used in this proposed work. Crystallization, recrystallization, and column chromatography will be used in order to carry out the isolation and purification of crude products obtained during the synthesis process. The identification and characterization of products obtained will be carried out with the help of elemental analysis, $^{1}H$ NMR, $^{13}C$ NMR and IR techniques.

## 5. IMPORTANCE OF STUDY/ SOCIETY APPLICATION

Since the last few years whole world has witnessed the outbreak of various viral diseases (e.g. COVID-19, Swine flu). As a consequence of this situation, there was a significant rise in demand for drugs. Chalcones, because of its numerous biological and medicinal applications plays a vital role in novel drug synthesis. Emphasis has been given to the synthesis of novel chalcones and its derivatives. The study of the biological activity of obtained products is the key aspect of the proposed work.

## 6. PROPOSED WORK PLAN

- Literature review.
- Synthesis of halosubstituted aldehydes and ketones.
- Preparation of chalcone from corresponding aldehydes and ketones.
- Perform synthesis of various derivatives such as benzodiazepine, benzothiazepine, pyrazoline, isooxazoline from newly synthesized novel chalcones.
- Evaluation of biological activity of obtained products.
- Preparation of final draft of research report.

## YEAR WISE PLAN OF WORK AND TARGET TO ACHIEVE

Present study is designed in such a way that it will come to a conclusive outcome within 03 years. The year wise plan includes;

**YEAR 01**

- Literature survey.
- Synthesis of different halosubstituted aldehydes and ketones.
- Synthesis of novel chalcones from corresponding aldehydes and ketones.

**YEAR 02**

- Perform literature survey for synthesis of benzodiazepine, benzothiazepine, pyrazoline, isooxazoline.
- Preparation of derivatives such as isooxazoline, pyrazoline, benzothiazepine, benzodiazepine from newly synthesized chalcones.
- Characterization & confirmation of obtained products by 1H NMR, 13C NMR, IR & elemental analysis.
- Publish research article in reputed and UGC care list mentioned journals, conferences, etc.

**YEAR 03**

- Evaluation of Biological activity of synthesized compounds.

- Compilation and interpretation of data and thesis writing. Submission of the thesis to university.

## 7. REFERENCES


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